Results: Technical success rate was 96.6%. Clinical success was 83.0%. Within 30 days postoperatively, 6.2% required repeat intervention; 4.2% required amputation; 3.3% experienced postoperative complications, including bleeding requiring transfusion (1.1%), thromboemboli (1.0%), infection (0.7%), respiratory complications (0.4%), and myocardial infarction (0.1%); and 3.3% died. Patency, limb salvage, and survival rates are listed in the Table.

Conclusions: The combination of thrombolysis and laser atherectomy is safe and effective in treating TASC C and D lesions in this high-risk group of patients with critical limb ischemia.

Deep Venous Thrombosis (DVT) in Critically Ill Trauma Patients: There Are No Low Risk Patients

Amir F. Azarbal, MD, Susan Rowell, MD, Jason Lewis, Shannon Moseley, Rakhee Urankar, MD, Erica Mitchell, MD, and Gregory L. Moneta, MD. Oregon Health and Science University, Portland, OR

Objective: American Chest Physician (ACP) guidelines stratify DVT risk in trauma patients based on injury pattern and medical prophylaxis. Screening is recommended only for the highest risk groups. Many screening studies for DVT have not investigated calf vein DVT (CVDVT) and did not exclusively target critically ill patients. Given new ACP guidelines recommending treatment of calf vein DVT, we investigated the efficacy of duplex ultrasound (DUS) screening of critically ill trauma patients for all lower extremity DVTs, including CVDVT, regardless of injury pattern, risk factors, or medical prophylaxis.

Methods: The records of 264 intensive care unit trauma patients who received DUS screening for lower extremity DVT were examined for data on high-risk injuries, DVT risk factors, and LMWH prophylaxis.

Results: DUS screening found DVT in 40 patients (15.2%), of which 25 (62.5%) were CVDVT, and 30% of all DVTs were diagnosed ≤1 week of admission. Patients without high-risk injuries receiving LMWH had a 13.5% DVT rate, which did not differ significantly from the 19.7% DVT rate in high-risk injury patients not receiving LMWH ($P = .667$). Patients without high-risk injuries who received LMWH had high rates of DVT, even excluding other DVT risk factors.

Conclusions: Lower extremity DVT is common in critically ill trauma patients, particularly in the first week after injury, regardless of injury pattern, DVT risk factors, or medical prophylaxis. Previous studies have underestimated DVT rates by not investigating CVDVTs. We recommend early DVT screening of all critically ill trauma patients.

Endovenous Ablation of Incompetent Perforator Veins Is Effective Treatment for Recalcitrant Venous Ulcers

Peter Lawrence, MD, Ali Alktaifi, MD, and David Rigberg, MD. UCLA Vascular Surgery, Los Angeles, CA

Objectives: Endovenous closure of incompetent saphenous veins has been reported to facilitate venous ulcer healing; however, there is little information about the effectiveness of perforator ablation (PA) in healing recalcitrant venous ulcers. We report our experience with PA with venous ulcers unresponsive to prolonged compression therapy.

Methods: Patients with nonhealing venous ulcers of >3 months' duration underwent duplex ultrasound imaging to assess their lower extremity venous system for incompetence of superficial, perforating, and deep veins. Patients who had either no saphenous incompetence or persistent ulcers after saphenous ablation underwent PA of incompetent perforating veins >3 mm that demonstrated reflux; initial treatment was performed on the perforator vein adjacent to the ulcer, with additional incompetent veins treated if ulcer healing failed.

Results: Fifty-six ulcers with 74 associated incompetent perforating veins were treated with PA in 44 patients with CEAP 4 (9%), 5 (6%), and 6 (85%) recalcitrant venous ulcers. Treated incompetent perforator veins were located in the medial ankle (67 %) and calf (33%). Initial success of PA, assessed by postprocedure duplex ultrasound imaging, was 55 %; reported complications of catheter site skin necrosis (0%), infection (0%), and nerve injury (0%) did not occur. In 18% of patients, more than one procedure was required for perforator closure; 73% had eventual successful perforator closure. Failure of perforator closure occurred in 27% and was associated with intercurrent illness, patient noncompliance, and patient death from unrelated causes. Of patients whose ulcers healed, the healing occurred at a mean of 2.3 months; an average PA of 1.5 incompetent veins per ulcer were required for healing.

Conclusions: This experience demonstrates both the feasibility and effectiveness of PA for a selected group of patients with venous ulcers who fail conventional therapy with compression.

Early Results of a Highly Selective Algorithm for Surgery on Patients with Neurogenic Thoracic Outlet Syndrome: A Prospective Analysis

Venita Chandra, MD, Cornelius Olcott, IV, MD, and Jason T. Lee. Division of Vascular Surgery, Stanford University Medical Center, Stanford, CA

Objective: Neurogenic thoracic outlet syndrome (nTOS) encompasses a wide spectrum of disabling symptoms that are often vague and difficult to diagnose and treat. We developed and prospectively analyzed a treatment algorithm for nTOS utilizing objective disability criteria, TOS-specific physical therapy, radiographic evaluation of the thoracic outlet, and selective surgical decompression.

Methods: Patients treated for nTOS from 2000-2009 were reviewed (n = 84). In period 1, most patients were offered surgery with documentation of appropriate symptoms. A prospective observational study began in 2006 (period 2), aimed to determine which patients benefitted from surgical intervention. Evaluation began with a validated QuickDASH (QD) quality-of-life scale (0-100, 100 = worse) and duplex imaging of the thoracic outlet. Patients then participated in physical therapy (PT) for 2 to 3 months and were offered surgery if there was documented improvement in symptoms.

Results: In period 1, 34 patients underwent first rib resection (68% female; mean age, 39; 18% athletes, 15% workers comp). In operated-on patients undergoing duplex imaging, 40% showed compression of the thoracic outlet on provocative positioning. Based on subjective improvement of symptoms, 59% of patients at 6 months had a positive outcome. In period 2, 50 consecutive patients were evaluated for nTOS (62% female; mean age, 35.4; 36% athletes, 14% workers comp) with a mean pre-PT QD score of 55.5. All patients were prescribed PT, and 21 (42%) were eventually offered surgical decompression (SURG) based on compliance with PT, interval improvement on QD score, and duplex compression of the thoracic outlet. Differences between the SURG and non-SURG cohorts are reported in the Table. At the 6-month follow-up, 93% of patients expressed symptomatic improvement, with the mean postoperative QD score decreasing to 23.3 ($P = .01$)

Conclusions: This highly selective algorithm for nTOS surgery leads to improvement in overall success rates documented subjectively and objectively. Compliance with TOS-specific PT, improvement in QD scores after PT, radiographic impingement, young age, and competitive athletics are associated with improved surgical outcomes. Long-term studies will be necessary to document sustained symptom relief and to determine who the optimal surgical candidates are.

Table. Prospective analysis of 50 patients evaluated for nTOS

Period 2 (n = 50)	*SURG (n = 21)*	*Non-SURG (n = 29)*	P
Age, y	27.9	40.9	.0002
Female	61.9%	62.0%	NS
Competitive athlete	61.9%	17.2%	.002
History of trauma	57.1%	17.2%	.006
Worker compensation	9.5%	17.2%	NS
Duplex obliteration of thoracic outlet	75%	60.7%	NS
Pre-PT QuickDASH	56.5	54.9	NS
Post-PT QuickDASH	49.3	48.4	NS
Improved after PT	76%	21%	.001

Infraclavicular First Rib Resection for Focused and Effective Treatment of Venous Thoracic Outlet Syndrome

Paul C. Johnston, MD, Michael S. Conte, MD, Charles M. Eichler, MD, Linda M. Reilly, MD, and Darren B. Schneider, MD. Vascular Surgery, University of California San Francisco, San Francisco, CA

Objective: Thoracic outlet decompression is an effective and durable treatment for venous thoracic outlet syndrome (VTOS), but there is no consensus regarding the optimal operative approach. Transaxillary, supraclavicular, or paraclavicular approaches are most commonly used, based largely on surgeon preference. However, unlike other forms of thoracic outlet syndrome, the pathology in VTOS is centered in the anteriorly located costoclavicular space. Therefore, we have adopted a focused infraclavicular approach with intraoperative venography that provides excellent access to the axillosubclavian veins and the costoclavicular space for effective treatment of VTOS patients.

Methods: Between June 2005 and March 2010, 32 consecutive patients underwent infraclavicular thoracic outlet decompression. All patients presented with symptomatic subclavian vein thrombosis, including 8 (25%) with acute (<14 days) and 24 (75%) with subacute or chronic (>14 days) thrombosis. Twenty-eight (88%) underwent catheter-directed thrombolysis preoperatively, often before referral to our institution.

Results: Infraclavicular first rib resection and intraoperative venography was technically successful in all patients. Adjunctive procedures included balloon angioplasty in 19 (59%) and venous stent placement in 1 (3%). Four patients with chronic vein occlusion or stenosis underwent partial division of the manubrium, vein reconstruction (patch angioplasty in 2 and interposition bypass in 2), and temporary AV fistula creation. At discharge, 31 patients (97%) patients had patent veins.